telephony

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Progress report: North American installations of time division digital switches

AMOS E. JOEL JR.

For the past 3 years, Amos Joel Jr., formerly of AT&T Bell Labs, now executive consultant for AT&T Technologies, has been providing TELEPHONY with hard data on progress made in installing time division digital switches in North America. This report includes the results for 1983, which are presented as Tables 5 and 6. It also includes the data for 1982, presented as Tables 3 and 4, and 1981, presented as Tables 1 and 2. Tables 1, 3 and 5 include information on which types of digital switches were installed and their size and location. Tables 2, 4 and 6 include information on the largest offices of each type of equipment. Tables 1 and 2 originally appeared in TELEPHONY, June 21, 1982, p. 32. Tables 3 and 4 first appeared in TELEPHONY, Aug. 22, 1983, p. 101. Tables 2, 3, 4, 5 and 6 appear on pp. 56 and 57.

Table 1

North American time division digital switching*

System	No. 4 ESS	ITS 4/5	DCO	DMS 10	No. 3 EAX	1210	DMS 100/200/ 300	NEAX 61	Totals
1. First service	1'76	3'76	7'77	10'77	3'78	9'78	4'79	5'79	
2. Base units in service as of year end (YE) 1981									
a) Total	74	165	219	443	33	112	150	47	1243
b) Class 5	NA	125	214	441	NA	77	92	33	982
c) Class 4/5	NA	22	4	(1)	NA	27	34	12	99
d) Class 4 only	74	18	1	2	33	8	24	2	162
3. Remote switching units in service YE 1981									
a) Total	NA	315	131	98	NA	50	63	29	686
b) On base units	NA	315	131	98	NA	50	63	0	657
c) On remotes	NA	NA	N/A	N/A	NA	NA	NA	29	29
4. Total lines in service YE 1981	NA	180K	380K	616K	NA	375K	910K	187K	2648K
5. Trunks in service YE 1981 on Class 4 or Class 4/5 offices	2174K	70K	37K	NA	149K	35K	137K	10K	2612K

*Year end 1981
NA—Not applicable
N/A—Not available
(1)—Included in Class 5

Table 2

North American time division digital switching*
Largest offices (YE 81)

System	Local		Toll		Local/toll	
	Location	Lines	Location	Trunks	Location	Terminations
No. 4 ESS	NA	NA	Houston	59.3K	NA	NA
ITS 4/5	St. Mary's, Ga.	5.6K	Gander, NF	1.2K	Mauston, Wis.	6.5K
DCO	S. Katy, Texas	7K	Boscobel, Wis.	1K	Middleton, Wis.	10.8K
DMS 10	Harrison, Ark.	5.1K	Redmond, Calif.	406	N/A	N/A
No. 3 EAX	NA	NA	New Westminster, B.C.	13.K	NA	NA
1210	Jefferson City, Mo.	20K	Glenwood, Ark.	2K	Roseville, Calif.	13K
DMS 100/200/300	Runnymede, Ont.	43.5K	Montreal	27.7K	Kitchner, Ont.	41.2K
NEAX 61	Victorville, Calif.	11.8K	Winter Park, Fla.	3.5K	Ridgecrest, Calif.	8.8K

* Year end 1981
NA-Not applicable
N/A—Not available

Table 3

North American time division digital switching
(1982)

System	ITT/North 1210	No. 3 EAX	No. 5 EAX	NEAX 61	DCO	DMS 10	DMS 100/200/300	ITS 4/5	No. 4 ESS	No. 5 ESS	Totals
1. Base units in service YE 82											
a) Total	163	36	10	78	292	612	263	183	90	2	1729
b) Class 5	111		10	63	286	597	148	125		2	1342
c) Class 4/5	42			13	5	14	67	41			182
d) Class 4	10	36		2	1	1	27	17	90		184
e) Other							21				21
2. Number of remote switching units in service YE 82											
On base units	75			49	141	145	248	319			977
3. Number of total lines in service YE 82	573K		25K	323K	509K	896K	1857K	308K		3K	4494K
4. Number of trunks in service YE 82 (Class 4 or 4/5)	57K	204K		16K	53K	3K	297K	19K	2713		3362K
5. Total systems and lines on order or expected YE 83											
Systems	N/A	39	650	145		1175	550	N/A	98	N/A	
Lines	N/A	N/A	3M	320K		1.5M	5M		NA	N/A	
Trunks	N/A	250K	NA	139K		NA	700K		N/A	N/A	

* +525 remotes
N/A—Not available
NA—Not applicable

Table 4

North American time division digital switching (largest offices)

	Local		Toll		Local/toll	
System	Location	Line	Location	Trunks	Location	Terminations
ITT/North 1210	Jeff. City, Mo.	20K	Jeff. City, Mo.	2.3K	Roseville, Calif.	4K
No. 3 EAX	NA	NA	Calgary, Alberta	5.8K	NA	NA
No. 5 EAX	First Colony, Texas	6K				
NEAX 61	Victorville, Calif.	13.7K	Winter Park, Fla.	5.8K	Thomaston, Ga.	10.4K
DCO	Ville Platte, La.	7.5K	Boscobel, Wis.	1K	Middleton, Wis.	10.8K
DMS 10	Harrison, Ark.	6K	Pearce, Ariz.	250	Pinetop, Ore.	2.1K
DMS 100/200/300	Toronto, Ont.	43.5K	Toronto, Ont.	23K	Kitchener, Ont.	40K
ITS 4/5*	St. Mary's, Ga.	7K	Gander, Newfoundland	1.2K	Mauston, Wis.	6.5K
No. 4 ESS	NA	NA	Los Angeles, Calif.	70.4K	NA	NA
No. 5 ESS	Cedarville, Ohio	2K				

NA—Not applicable
*—1981 data

Table 5

North American time division digital switching (YE 83)

System	ITT/North 1210	No. 3 EAX	No. 5 EAX	NEAX 61	DCO	DMS 10	DMS 100/200/300	ITS 4/5	No. 4 ESS	No. 5 ESS	AXE 10	E10-5 (TSS)	Totals
1. Base units in service YE 83													
a) Total	191*	27	75	104	402	794	384	183	99	13	1	2	2274
b) Class 5	137		68	77	375	778	215	125	NA	11		2	1687
c) Class 4/5	44		6	19	22	15	92	41		2			241
d) Class 4	10	27		3	5	1	35	17	99				197
e) PABX-CPE			1	N.A.			8						9
f) International	gateway				2			1		(8)			
							3						
g) OCC tandem				3			32				1		36
h) Mobile radio													
2. Number of remote switching units in service YE 83													
	95	NA	5	68	208	189	276	319		NA			960
3. Thousands of total lines in service YE 83													
	712	NA	550	410	739	1181	2800	368	NA	66		3	7429
4. Thousands of trunks in service YE 83 (all classes)													
	66	233	21	77	96	7	500	23	2975	5			4003

N.A.—Not available
NA—Not applicable

Table 6

North American time division digital switching largest installations (YE 83)

System	Local		Toll		Local/toll	
	Location	Lines	Location	Trunks	Location	Terminations
1210	Jefferson City, Mo.	20,140	Jefferson City, Mo.	2324	Roseville, Calif.	4000
DCO	Cheshire, Conn.	10,000	Boscobel, Wis.	1000	Middleton, Wis.	10,800
DMS 10	Harrison, Ark.	6300	Redmond, Ore.	800	Cheyenne, Okla.	1700
DMS 100 family	Toronto, Ont.	40,000	Montreal	29,900	Butler, Pa.	27,120
EAX 3			Calgary	15,360		
EAX 5	Lincoln, Neb.	25,000	Oberlin, Ohio	883	Lafayette, Ind.	10,888
ESS 4			Los Angeles	71,000		
ESS 5	Bradford, Pa.	12,000			Leesberg, Va.	13,000
NEAX 61	Victorville, Calif.	13,752	Winter Park, Fla.	5640	Thomaston, Ga.	10,246
E10-5	Cloverdale, Ind.	4,200				

IEEE: the pivot of standards work in the United States

IEEE plays a crucial role in the development of technical standards. This article reviews the history of the IEEE and its functions in terms of standards work

J.L. KOEPFINGER

ALTHOUGH MANY people may not recognize the importance of standards, without them technological progress could not have been achieved. Last year the electrical industry celebrated its 100th anniversary. This year the Institute of Electrical and Electronics Engineers, Inc. (IEEE) celebrates its 100th anniversary. Almost since its inception, IEEE has been associated with the development of standards for the electrical and electronic industry.

Early work

The IEEE was formed in 1962 from a merger of the American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE). Shortly after the formation of the AIEE in 1883, the members became aware of the need for this professional society to have as one of its purposes the development of standards. In 1889 a committee was appointed to formulate a standard wiring table for light and power purposes.

The next action in the field of standards for AIEE (IEEE) occurred in June 1891 with the appointment of a Standing Committee on units and standards composed of such distinguished engineers as A.E. Kennelly, F.G. Crocker, W.E. Geyer, G.A. Hamilton and G.B. Prescott Jr.

The Standing Committee was instrumental in promoting the adoption of names for four magnetic units: Gilberts, magnetomotive force; Webers, Flux; Oersted, reluctance; and Gauss, flux density. It also made recommendations on standards for units and terminology in the international field of electrical engineering, by being instrumental in the adoption of the term induction with the symbol L and of the term reactance, suggested by C.P. Steinmetz.

The first official institute standard was issued on Jan. 26, 1898, by the Standing Committee and was titled, "Report of the Committee on Standardization." A principle was established by this report. The report defined characteristics, behavior, rating and method of testing of electrical machinery and apparatus. It avoided standardization of size and dimension. It is important to note that in 1898 the developers of this first AIEE/IEEE standard were leaders in the electrical engineering field. They were: Crocker, Cary T. Hutchinson, Kennelly, J.W. Lieb Jr., Steinmetz,

Continued on page 102

Table 1

Society	Approx. number of standards
Acoustic, Speech & Signal Processing Society	3
Broadcast Technology	9
Cable Television Group	1
Communications Society	23
Computer Society	4
Electromagnetic Compatibility Society	8
Instrumentation & Measurement Society	1
Magnetic Society	5
Microwave Theory & Technique Society	5
Power Engineering Society	5
Quantum Electronics and Applications Society	1
Reliability Society	1
Vehicular Technology Society	1
SCC 10 Definitions	10
SCC 14 Quantities, Units, Letter Symbols	5
Total	96

J.L. Koepfinger is Director-Protection and Communications, Duquesne Light. This article has been adapted from a presentation made on May 17, in Atlanta, at the Southeastern Telecommunications Showcase sponsored by the United States Telephone Assn. and the United States Telecommunications Suppliers Assn.

Lewis R. Stillwell and Elihic Thomson.

IEEE has functioned as a voluntary standardizing body ever since. Its standards activities have grown to include all phases of the electrical and electronic disciplines. Since about 1970 the number of standard activities of the institute have shown a dynamic increase. This reflects the impact of the maturing of the electronic technology and the need for standardization.

Standards and society

It is the goal of IEEE to generate standard publications that have the broadest potential international acceptance. In achieving this goal, IEEE depends upon the assistance of volunteers who possess the desire, the tenacity and the expertise necessary to develop standards that will provide the industry and the consumer with means to measure or compare a product and to ensure that safety has been considered, where applicable.

The institute's policy is to avoid the development on specific devices or hardware which characterizes their commercial size, arbitrary ratings or performances associated with warranties. Rating and dimensional information may be developed and included in IEEE standards provided such information results from technical consideration and is not developed by IEEE on an arbitrary basis.

IEEE, thus, provides standards with the following characteristics:

- Scientific methods of measurement or tests of the parameters or performance of any device, apparatus, system or phenomenon associated with the art, science and technology of any field within the scope of IEEE.
- Characteristic, performance and safety requirements associated with devices, equipment and systems with engineering installations.
- Recommendations reflecting state of the art in the application of engineering principles to any field of technology within the scope of IEEE.

Current activity

Standards are developed on a voluntary basis by the societies and standard coordinating committees of IEEE. There are 32 societies and 11 standard coordinating committees (SCC). Standards pertaining to the communication field are not exclusively developed within the Communication Society.

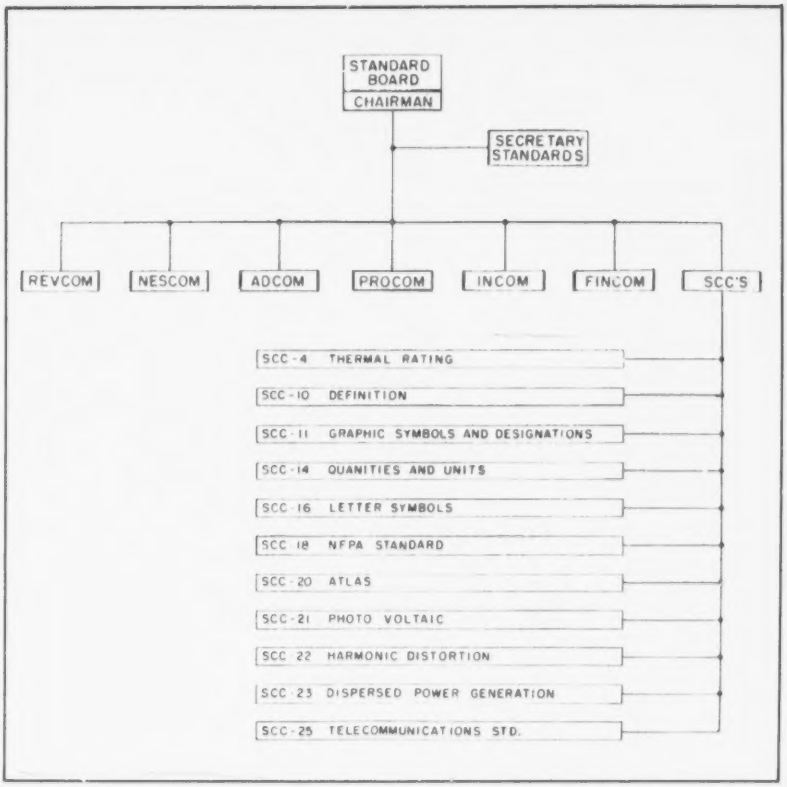


FIG. 1 *An organizational chart of the Standards Board and the Standard Coordinating Committees of the IEEE.*

The nature of communications causes it to have an affinity with other societies. Table 1 is a list of the societies and SCCs involved in the voluntary development of standards having a relationship to the communications industry.

In addition to the standard activities of the 15 societies and SCCs shown in Table 1, a new Standard Coordinating Committee, SCC 25, Telecommunications Standard, was formed by the IEEE Standards Board in 1983. This committee is chaired by Edward Cohen. Its formation was undertaken since it was recognized by the IEEE that the deregulation of the telephone industry would result in a need to coordinate within IEEE the voluntary development of standards which specifically relate to the telecommunication industry. This SCC is responsible for interfacing with the American National Standards Institute (ANSI) and other standardization bodies outside of IEEE.

Over the course of the last 15 years, IEEE has developed a structured process for standard development. This process involves all levels of the IEEE voluntary standards developing organization. To provide an understanding of the working of this system, it is useful to first understand the structure of the IEEE Standards Board and the structure of the IEEE technical activities.

The IEEE Standards Board is composed of a board of directors and six standing committees; in addition it has 11 SCCs (Figure 1).

REVCOM functions to review standards submitted for Standards Board approval. It prepares a consent agenda for the Standards Board as well as review questions on the proposed standard with its developer.

NESCOM's purpose is to review new standard projects to ensure that the standard being considered is needed and to determine that proper coordination is established. INTCOM's assistance is to assure that IEEE standards establish an interface and coordination with international standards, in particular the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO). The remaining three committees' functions are to deal with administrative matters. SCC 25, which was mentioned earlier, is one of these committees. These committees provide a form for coordination and development of standards which

Continued on page 105

have multi-discipline interests. They, plus the technical groups and societies of the institute, provide for the voluntary development of IEEE standards.

Technical societies, through the technical committees, subcommittees and working groups, do the yeoman's work of the IEEE standard development. Generally, the development of a standard starts because a need is identified by one of the societies' entities. So that coordination is maintained and a control is achieved, the society must submit a project authorization request (PAR) to NESCOM. If the PAR is approved with the proper coordination, then the entity can begin developing the standard.

Many drafts of the standard are usually produced and exchanged with people who have indicated an interest as defined by the PAR. When it appears that adequate agreement of the subject matter has been achieved, a formal ballot is usually conducted on the proposed standard by the subcommittee. After approval by the subcommittee, a second formal ballot is conducted by the main committee or the societies' designed standard approving body. At each step, a dedicated action is required for the resolving of comments and negative ballots.

Upon approval of the proposed standard by the societies' designated standard approving body, the document is forwarded to the Standards Board where it is presented for the review and ballot of REVCOM. REVCOM prepares a consent agenda for final voting action on a standard by the IEEE Standards Board.

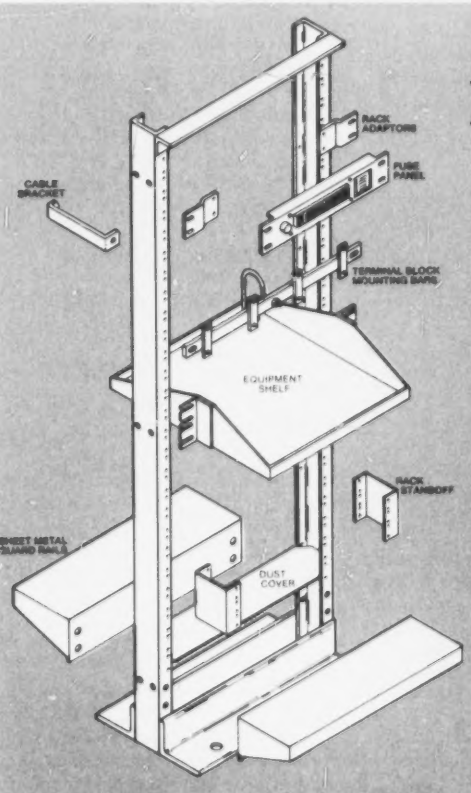
ANSI and IEEE

IEEE is recognized by ANSI as an accredited standardizing body. It, thus, in its own right can promulgate American National Standards using ANSI accredited procedure for an accredited organization. In many cases, however, IEEE standards are submitted to standard committees, such as C37, C62 and C12, for processing as an American National Standard under their sponsorship.

As an accredited standard development organization, IEEE is committed to openness in the development of standards. It provides for an opportunity for participation of all interested parties. An appeals procedure is in place to address grievances as they relate to standards development.

IEEE has a deep commitment to the development of standards. This is evident by the dedication of approximately 20,000 members who assist in carrying out the standards development. These members are assisted by the small but equally dedicated staff of the Standards Office headed by Sava I. Sherr. □

'The institute's policy is to avoid the development of standards on specific devices or hardware which characterizes their commercial size, arbitrary ratings or performances associated with warranties.'



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